

REMARKS

Claims 5, 6, 11, 12, and 15 have been amended to correct an obvious and inadvertent clerical error.

No new matter has been added.

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**BEST AVAILABLE COPY**CLAIMSClaim Objection

The Examiner objected to Claim 1 because the

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"limitations of claim 1 refer to a process for determining a first and second motion vector with respect to a predetermined pattern of pixel, which seems to be used for both the first motion vector and the second motion vector. However Applicant's Specification, pages 11-14 discloses multiple embodiments wherein each of a first and second motion vector are produced using a different predetermined pattern of pixels for each computation respectively."

The Examiner's interpretation of Claim 1 is generally accurate with regards to the predetermined pattern of pixels being "used for both the first motion vector and the second motion vector." However, Applicants believe the Examiner confuses the relationship of the which motion vectors and macroblocks in Claim 1.

Specifically Claim 1 recites "method of determining a first motion vector and a second motion vector for a first macroblock and a second macroblock, respectively, of a present image from a previous image", "computing the first motion vector using the first origin block and the first macroblock", and "computing the second motion vector using the second origin block and the second macroblock." Thus, the first motion vector is for a first macroblock and the second motion vector is for a second macroblock. As explained in the Specification: "To encode a digital image using macroblocks and motion vectors, each macroblock MB(x, y) of a digital image is compared with the

preceding digital image to determine which area of the preceding image best matches macroblock MB(x, y)." (Specification Paragraph [0009]).

Furthermore, as explained in the Specification, "Figs. 8(a) and 8(b) illustrate a predetermined pattern 820 and a subpattern 830.." (Specification, Paragraph [0035]) "[F]irst phase processing units 730A and 730B would use only the pixels in subpattern 830 to calculate a difference measure for a macroblock MB(x, y). However, second phase processing units 740A and 740B would use the pixels in predetermined pattern 820 to calculate a difference measure for a macroblock MB(x,y)." Thus, second phase processing units 740A and 740B would use the "predetermined pattern" to compute the first motion vector for the first macroblock and to compute the second motion vector for the second macroblock. Accordingly, Applicants respectfully request reconsideration and withdrawal of the objection to Claim 1.

Claim rejections under 35 U.S.C. § 103

Claim 1-6

The Examiner rejected Claims 1-3, 5-8, and 10-19 under "35 U.S.C. 103(a) as being unpatentable over US Patent No. 5,576,772 to Kondo." Specifically with regards to Claim 1 the Examiner stated that:

As for claim 1, Applicant claims, "selecting a predetermined pattern of pixels in the previous image", Kondo discloses in Column 6, lines 45-49, a predetermined search range of the reference frame, wherein the reference frame is a previous frame, and contains a specific pattern of pixels. ... Claim 1 further requires "computing a second macro-block difference measure for each of a second plurality of pixel blocks in the

previous image to form a plurality of second macro-block difference measures for the second macro-block using the predetermined pattern of pixels". Column 9, lines 15-38 describe the differencing process, between the base block (reference block or previous block) and an inspection block or search area, which has been shown to have a predetermined pattern of pixels.

Based on the Examiner's objection to Claim 1 (discussed previously), Applicants believe that the Examiner is interpreting Claim 1 erroneously to use different predetermined patterns with respect to the first motion vector and the second motion vector. However, amended Claim 1 recites "selecting a predetermined pattern of pixels in the previous image" and "computing a first-macroblock difference measure for each of a first plurality of pixel blocks in the previous image to form a plurality of first-macroblock difference measures for the first macroblock using the predetermined pattern of pixels" and "computing a second-macroblock difference measure for each of a second plurality of pixel blocks in the previous image to form a plurality of second-macroblock difference measures for the second macroblock using the predetermined pattern of pixels" (emphasis added). Thus, in Claim 1 the predetermined pattern of pixels is used for computing a first motion vector for a first macroblock and a second motion vector for a second macroblock. However, in Kondo each base block has its own search range rather than using the same predetermined pattern of pixels. Specifically, Kondo teaches that

"The predetermined search range, also referred to as the third hierarchical stage search range, is  $8 \times 8 = 64$  ( $4 \times 4$  blocks). An inspection block is positioned at each of

these block positions in the predetermined search range of the reference frame and a third hierarchical stage evaluation value is obtained at each position of the inspection block. The minimum of the evaluating values is detected. Since there are eight blocks in the horizontal and vertical directions of the predetermined search range, each coordinate of the motion vector of the third hierarchical stage is in the range -4 to +3. (emphasis added) (Kondo, Col. 9, line 61 to Col. 10, line 8):

Because "each coordinate of the motion vector of the of the third hierarchal stage is in the range -4 to +3", Applicant respectfully submit the predetermined search range for each base is a different set of 8x8 blocks. Thus, Applicants respectfully submit Claim 1 is patentable over Kondo. Furthermore, Applicants respectfully submit that Claims 2-6, which depend from Claim 1, are likewise patentable.

#### Claim 7-14

With respect to Claims 7, 13, and 14 the Examiner stated "the added limitations, in addition to those limitation of claim 1, which are rejected above, involve using a sub-pattern of pixels selected from the predetermined patter of pixels, for taking difference measures are shown in Figures 9A-9C, wherein Kondo uses sub-patterns of pixels in the first and second hierarchical stages of his invention."

Like Claim 1, Claim 7 recites "selecting a predetermined pattern of pixels in the previous image", "computing a first accurate first-macroblock difference measure for the first closest first-macroblock matching pixel block using the predetermined pattern of pixels", and "computing a first

accurate second-macroblock difference measure for the first closest second-macroblock matching pixel block using the predetermined pattern of pixels" (emphasis added). As explained above with respect to Claim 1, the search range taught by Kondo does not teach or suggest the predetermined pattern of pixels. Therefore, Applicant respectfully request reconsideration and withdrawal of the rejection of Claim 7. Furthermore, Applicants respectfully submit that Claims 8-14, which depend from Claim 7 are also patentable.

In addition, Applicants respectfully submit that Fig. 9A-9C of Kondo does not teach or suggest "selecting a subpattern of pixels from the predetermined pattern of pixels" as recited in Claim 7. As explained by Kondo, "FIGS 9A-9C show the representation of a (4x4) block in the first, second and third hierarchical stages, respectively" (Kondo, Col. 8, lines 13-15). "In the third hierarchical stage shown in Fig. 9C, which is the first part of the motion vector detection operation, a constant component comprising the mean value  $m$  of the pixels in a (4x4) block and a transient component comprising the standard deviation  $a$  of the pixels in the (4x4) block are calculated" (Kondo, Col. 8, lines 27-32). Because the mean and transient for all 16 pixels are calculated, Applicants respectfully submit that Fig. 9C does not teach or suggest "selecting a subpattern of pixels from the predetermined pattern of pixels" as recited in Claim 7.

"In the second hierarchical stage shown in Fig. 9B, which is the middle part of the three stage motion vector detection operation, the original (4x4) block is segmented into four (2x2) blocks, and each (2x2) block is represented by a constant component, its mean value, and a transient component, its standard deviation". (Kondo, Col. 8, lines 58-63). Once again because means and standard deviations are calculated using all

16 pixels of the blocks, Applicants respectfully submit that Fig. 9B does not teach or suggest "selecting a subpattern of pixels from the predetermined pattern of pixels" as recited in Claim 7.

In the first hierarchical stage shown in Fig. 9A, which is ~~the last part of the motion vector detection operation, one~~ block is represented as an arrangement of (4x4) pixels."

Because all 16 pixels of the blocks are used, Applicants respectfully Submit that Fig 9A, does not teach or suggest "selecting a subpattern of pixels from the predetermined pattern of pixels" as recited in Claim 7." Therefore, Applicants respectfully submit that in addition to the reasons given above with regards to Claim 1, Claim 7 is patentable over Kondo for reciting "selecting a subpattern of pixels from the predetermined pattern of pixels." Accordingly, Applicants respectfully request reconsideration and withdrawal of the rejection of Claim 7. Furthermore, Applicants respectfully submit that Claims 8-14, which depend from Claim 7 are also patentable.

#### Claim 15-19

With respect to Claims 15-19, the Examiner stated that "the processors, comparator, buffer, and cache as claimed in claims 15-19, for the purpose of performing differencing, storing, and comparison, of pixel data, are well known functions, and components of motion vector calculation schemes and apparatuses." However, Claim 15 recites "a first first-phase processing unit coupled to the frame buffer and configured to compute a first plurality of first-macroblock difference measures and a first plurality of second-macroblock difference measures using a predetermined pattern of pixels". As explained

above with respect to Claim 1, Applicants respectfully submits that Kondo does not teach or suggest using a predetermined pattern of pixels for both a first macroblock and a second macroblock as used in the Claims. Thus, Applicants respectfully request reconsideration and withdrawal of the rejection of Claim 15. Furthermore, Applicants respectfully request reconsideration and withdrawal of the rejection of Claims 16-19, which depend from Claim 15.

Allowable Subject Matter

The Examiner stated that Claims 4 and 9 are "objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims." Applicants appreciate the Examiner's finding of allowable subject matter. However because Claims 1 and 7 are patentable for at least the reasons given above, Claims 4 and 9, which depend from Claims 1 and 7, respectively, are also patentable.



CONCLUSION

Claims 1-19 are pending in the present application. Reconsideration and allowance of these claims is respectfully requested. If there are any questions, please telephone Edward Mao at (925) 895-3546 to expedite prosecution of this case.

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Respectfully submitted,

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CERTIFICATE OF TRANSMISSION (37 C.F.R. 1.8(a))

I hereby certify that, on the date shown below, this correspondence is being transmitted by **facsimile** to the Patent and Trademark Office.

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